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AUTHOR Cooney, Thomas J.; Shealy, Barry E.
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ABSTRACT

Five secondary school teachers participated in a 3-year project to support the rethinking of their assessment practices. The teachers met regularly to share ideas, submitted assessment tasks and their assessments of students, and received feedback. All of the teachers professed significant changes in their understanding of assessment and four changed their teaching significantly. The teachers' written contributions to the project, interviews with the teachers and their students, and observations of the teachers' teaching were analyzed. Key factors from the nature of the teachers' beliefs and their social situations were identified that facilitated and/or inhibited change. (Author)

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Thomas J. Cooney and Barry E. Shealy

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TEACHERS' THINKING AND RETHINKING ASSESSMENT PRACTICES

Thomas J. Cooney, University of Georgia
Barry E. Shealy, University at Buffalo, SUNY

Five secondary school teachers participated in a three-year project to support the rethinking of their assessment practices. The teachers met regularly to share ideas, submitted assessment tasks and their assessments of students, and received feedback. All of the teachers professed significant changes in their understanding of assessment and four changed their teaching significantly. The teachers' written contributions to the project, interviews with the teachers and their students, and observations of the teachers' teaching were analyzed. Key factors from the nature of the teachers' beliefs and their social situations were identified that facilitated and/or inhibited change.

The mathematics education community currently reflects a significant consensus on broadening student outcomes. We have moved from sole emphasis on computational skills to including problem solving, communication, and reasoning. Teachers tend to agree that this shift is important and many are now able to find curricular materials that reflect the current emphases, if not becoming more adept at developing their own student activities. Teachers are, however, much less comfortable with assessing broader outcomes in student performance (Romberg, 1992), seeing these assessments as less objective than those calling for production of single number answers. This discomfort is troubling as assessment plays an integral role in shaping students' expectations and determining what gets valued and learned (Crooks, 1988). Based on these concerns, it seems important to better understand where teachers are in their capability to utilize a broader view and practice of assessment. A teacher education issue is, then, to understand the process by which teachers grow in confidence and ability to make assessments reflecting broader student outcomes, a process deeply connected to the nature of beliefs and social contexts.

Theoretical Considerations

The belief systems of teachers and the social contexts they find themselves in are crucial interacting agents within a teacher's growth process (Brown & Borko, 1992; Thompson, 1992). Several key ideas assisted us in thinking about the teachers' thinking and practice, particularly changes in thinking and practice. First, beliefs that are central (Green, 1971) to one's belief system, that is, strongly connected to other beliefs, would be more difficult to change than those held peripherally in belief systems and also have greater impact on one's practice. Second, someone who is open to the incorporation of new ideas, who's belief structure is permeable (Kelly, 1955), is also more likely to change his or her beliefs and practice. Furthermore, a person's expressed beliefs and practices will be affected by social supports and constraints, perceived or actual (Brown & Borko, 1992).

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Partnership with Five Teachers

A group of grade 7-12 mathematics teachers participated in a study of their evaluation practices (Cooney, Badger, & Wilson, 1993). Following this study, five of the teachers volunteered to join a project to receive support for rethinking their assessment practices over three years. The project included quarterly workshops to help the teachers formulate plans for assessment and to share materials and experiences from their classrooms. The study that follows describes their process of growth over the three years. Data included written responses to surveys, individual and group interviews, and workshop field notes. The teachers regularly submitted copies of their assessment tasks, sample student work with the teachers' assessments, and written rationales for their practices. Each teacher's students responded to a survey and participated in group interviews. Project staff also made classroom observations early in the project. We looked for evidence of the teachers' understanding of mathematics and assessment and the practice of teaching mathematics. We focused on the nature of these beliefs in terms of Green's (1971) central-peripheral organization and the permeability (Kelly, 1955) of the teachers' belief systems. We also looked for social aspects of the teachers' situations which supported or inhibited change.

The Case Studies

Carol

Carol has taught nine years in a middle school where students have not experienced a great deal of academic success. Recognized as an outstanding teacher, she is deeply concerned about her students and, as a consequence, is quite demanding of them. Her principal was very supportive of any innovation she wished to try. Early in the project, Carol's belief that "mathematics consists of computations, concepts, problems, and skills" was central (Green, 1971) to her understanding what students were to learn. Thus, her tests were almost exclusively computational in nature. In interviews, her students also reflected this view of mathematics, no doubt a reflection of their mathematical experiences.

Eventually, Carol modified her orientation toward assessment. While clinging to the notion that learning mathematics consisted primarily of acquiring basic skills, she allowed that the acquisition of basic skills could include experiences with more open-ended items. Consequently, her tests became less computational as she began to pose such questions as, "Terry thinks that 24.36 - 3.6 = 24.00. Where did Terry make his mistake?" Carol also began engaging the students in projects with real world data and requiring her students to keep daily journals. Her students indicated she always asked them to explain their work. Recognizing her earlier computational orientation, she attributed her change to seeing other teachers in the project successfully try new practices and incorporating ideas from the project into her teaching. While she continued to hold a perhaps more computational orientation than other teachers on the project, she reflected progress and change.

David

David had seven years of experience teaching in a private school in which parental expectations were high and the teachers were encouraged to be innovative. He had a keen interest in mathematics and used the following adjectives to describe mathematics: puzzle, game, challenging, logical, and analytical. His stated characteristics of good teaching (being energetic, knowing the content, challenging students, being adaptive, and helping students think analytically) characterized his teaching as well. His emphasis on being adaptive reflects his value of self-improvement and is indicative of a permeable belief system (Kelly, 1955).

It was readily apparent that David concentrated on process with his students and not just procedures. He saw "alternate assessment as a means of [getting] a better understanding of how my students think." What changed over the course of the project was his ability to create open-ended items and an acquired expertise in analyzing students' responses to more process-oriented questions. According to one of his students, "His questions are a lot different than some of my other math teachers. It makes you think." As strong a teacher as David is, however, a caveat is in order. His last few tests regressed slightly in that they did not have the creative items evident on his earlier tests. When questioned about this, David indicated that this was his first year of teaching trigonometry and he was a little anxious about the material. Thus, lack of comfort with the content had a greater effect on his teaching than his commitment to alternate assessment.

Karen

Karen has taught middle and high school mathematics and is currently in a urban/ suburban public school district. Early in the project, like Carol, Karen exhibited a computational view of mathematics and her tests tended to be computational in nature. At one point she said, "I finally decided that testing for deep and thorough understanding was going to be [the students'] total undoing." Later, after giving a test with more open-ended questions, she said "although I liked the results, it took me more than three times as long to grade [the tests] than usual." The issues of what the students could handle and the time required to develop and grade tests were significant concerns for Karen.

Eventually, Karen became more comfortable with creating and using open-ended items and was even an outspoken proponent of the techniques, sharing with her colleagues and other teachers. Karen's instructional practice, however, was slower to change. Several of her colleagues, including her department chair became interested in the project and began to try new approaches to assessment in their own classrooms. This opportunity for support in changing instruction and sharing efforts was important for Karen's development.

Esther

Esther is a high school teacher in an urban school district and has taught for twelve years. Like Carol and Karen, Esther expressed computational and procedural views of mathematics early in the project. She said she enjoyed the project

because, in teaching, "you seldom get to interact with other teachers, . . . you are sort of on your own." She appreciated the challenge to think about her tests and the "nudge to do more problem solving activities." Over the first two years of the project, Esther added more open-ended items to her primarily computational tests and used activities she received through the project as "warm-ups" in her class.

Later in the project, Esther showed little evidence of trying alternate assessment activities with her students. For example, one idea emphasized in the project was valuing multiple solutions of problems. When asked about alternate ways of doing a problem a student said, "She says 'yeah, you could do it that way, but this is the way we want you to do it because this is the way we teach you.'" A change in teaching assignments may have precluded much progress in using alternate assessment practices. Esther's concern for losing control of the classroom when using more open activities—losing control both of classroom discipline and of the direction of the mathematics—seems to have been a more significant factor. This concern was evident in observations and interviews with Esther and explicitly expressed by her to the group.

Linda

Linda is a middle school teacher in the same private school as David. She has taught for ten years. When she describes mathematics she uses words like "real life," patterns, and colorful. She regularly involves her students in open-ended projects. In education, she tends to focus on a holistic view of the child, emphasizing life skills and conceptual understanding. She sees assessment as determining "what goes on in [the students'] heads. From the beginning of the project, her written tests could range from 10% to 70% open-ended in nature with such questions as, "Write a problem where the commutative property can be used to make it easier to solve and explain why the commutative property is helpful in your problem." From the student interviews, it is clear these types of question are representative of the tasks she provides for her students.

While Linda's tests did not change significantly over the course of the project, she was more open to trying new practices than the other teachers. Linda was the first of the teachers to use portfolios, student interviews, and student-generated tasks in her assessments. Clearly, the support of a colleague, David, and the supportive administration contributed to Linda's freedom to innovate. The project provided Linda with ideas and people to "bounce ideas off of."

Reflecting on the Case Studies

Several clear struggles arose as the teachers tried to use new assessment techniques. They found that having a process-oriented classroom is a challenge—for both students and teachers. It takes more time, seems to makes life in the classroom more complicated, and surely less certain. Teachers have to revise the nature of their roles as teachers and students have to assume greater responsibility for their own learning. The project teachers held these concerns, but interestingly, these teachers saw the rewards as clearly worth the extra effort. They could not

envision returning to teaching in which assessment consisted solely of students performing algorithmic tasks.

Key aspects of the project and the teachers' own circumstances contributed to their growth or lack of growth. The initial support of the project staff, the collegial support of the teachers and later peers in their own schools were important elements for change for the teachers. The on-going encouragement over an extended length of time was another aspect of the project the teachers felt contributed to their development. Linda, David, and Carol had interested and supportive principals who provided freedom and encouragement for innovation. Esther, in contrast, was in a situation where her teaching was strictly prescribed inhibiting, if not ruling out, trying new practices. Thus, local and external support and perceived freedom within the teaching situation are important change agents.

Investigating the teachers' belief systems provides further insight into the differing nature of the changes and struggles they experienced. One difference among the group of teachers is the central beliefs (Green, 1971) relating to the nature of mathematics. Carol's view of mathematics as a set of rules by being central is less amenable to change. This impermeability may explain her initial reluctance to try new practices and her reticence to share within the group; although by the end of the project she was involving students in extended open-ended projects. Karen's view of mathematics, while similar to Carol's, was more open to broader process-oriented student outcomes. Thus, she was able to assimilate many ideas of alternate assessment and be an outspoken advocate while initially changing little in her classroom. Over the course of the project she was able to accommodate alternate assessment into her instructional program—if for no other reason than to train the kids to do open-ended items. Thus, we see a case where peripheral beliefs about classroom practice change allowing alternate assessment in without changing her basic notion of the nature of mathematics. For David, however, using such practices as open-ended tasks is at the core of what he believes, but his peripheral fear of teaching new content temporarily requires him to back off his commitment to alternate assessment.

The foregoing analysis raises a "chicken-and-egg" question. The teachers who were most innovative had the most supportive teaching contexts, appeared to have the most permeable belief systems, and held central beliefs about mathematics most in line with current reform ideas. It would be interesting to see the result of Linda and David changing places with Carol, Karen, and Esther. Would permeable belief systems and open views of mathematics and teaching withstand restrictive, unsupportive teaching environments? The nature of belief systems—central beliefs about mathematics and teaching and the openness to new ideas—and the social situation of teaching—support of peers and administrators, time for interaction with peers, supportive curricular materials, and freedom to innovate—have critical effects on the ability of teachers to rethink and change their practices.

References

Brown, C. A., & Borko, H. (1992). On becoming a mathematics teacher. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning*, (pp. 209-242). New York: Macmillan.

Cooney, T., Badger, E., & Wilson, M. (1993). Assessment, understanding mathematics, and distinguishing visions from mirages. In N. L. Webb (Ed.), *Assessment in the mathematics classroom* (pp. 239-247). Reston, VA: NCTM.

Crooks, T. (1988). The impact of classroom evaluation practices on students. *Review of Educational Research, 58*, 438-481.

Green, T. (1971). *The activities of teaching*. New York: McGraw-Hill.

Kelly, G. A. (1955). *The psychology of personal constructs* (vol. 1). New York: Norton.

Romberg, T. A. (1992). Evaluation: A coat of many colors. In T. A. Romberg (Ed.), *Mathematics assessment and evaluation* (pp. 10-36). Albany, NY: SUNY Press.

Thompson, A. G. (1992). Teachers' beliefs and conceptions: A synthesis of the research. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning*, (pp. 127-146). New York: Macmillan.